

TALC AND PYROPHYLLITE

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The mineral talc is a hydrous magnesium silicate. A massive talcose rock is called steatite, and an impure massive variety is known as soapstone. Talc is used commercially because of its fragrance retention, luster, purity, softness, and whiteness. Other commercially important properties of talc are its chemical inertness, high dielectric strength, high thermal conductivity, low electrical conductivity, and oil and grease adsorption. The major markets for talc are ceramics, paint, paper, and plastics.

Pyrophyllite is a hydrous aluminum silicate with a structure similar to talc. Such properties as chemical inertness, high dielectric strength, high melting point, and low electrical conductivity make it useful for ceramic and refractory applications.

In 2002, production of talc declined from that of 2001, although domestic sales increased to 791,000 metric tons (t) from 784,000 t in 2001. Exports and imports increased to 166,000 t and 232,000 t, respectively. Apparent consumption declined to 841,000 t. Production and sales of pyrophyllite increased in 2002.

Legislation and Government Programs

In 2002, the U.S. Department of Defense authorized the disposal of 910 t of block and lump talc and 988 t of ground talc, which is the entire uncommitted inventory, from the National Defense Stockpile.

ASTM International held a conference in Johnson, VT, to discuss issues surrounding asbestos, including the identification of fibrous-amphibole and fibrous-talc intergrowths. Discussions on fibrous talc focused on its geologic origins, the complex mineralogy of fibrous-talc and fibrous-amphibole intergrowths, problems encountered when using standardized protocols to identify talc and amphibole intergrowths with electron microscopy, and results of epidemiologic studies on miners and millers exposed to fibrous talc.

A study on the geologic origins of fibrous talc concluded that transitional fibers (those containing both amphibole and talc structures) were formed by metasomatism resulting from regional or contact metamorphism. Large U.S. talc deposits of metamorphic origin consistently contain amphiboles (most commonly anthophyllite or tremolite), often as major components. In contrast, descriptions of hydrothermal talc deposits consistently lack mention of amphiboles, fibrous or otherwise. Host protolith is not the primary control on the presence or absence of amphiboles and transitional fibers. A stress fabric, imposed by regional or contact metamorphism, apparently encourages fibrous amphibole growth, which involves early formation of acicular amphiboles and subsequent partial to complete replacement by talc (Van Gosen and Meeker, 2002, p. 41).

A study was done on fibrous talc from Montana, New York, and Texas. The samples examined contained talc with a fibrous habit and fibers consisting of amphibole and talc intergrowths. The intergrowths exhibited optical properties that were intermediate between talc and the intergrown amphibole. These properties varied depending on the degree of alteration. The more highly altered fibers contained a lower percentage of amphibole structures in the mineral grain. Proper identification is critical when analyzing samples for asbestos so as not to misidentify fibrous talc as asbestos (Greenwood and Wylie, 2002, p. 39).

A workshop was convened by the National Institute of Standards and Technology (NIST) during the ASTM International meeting to develop a strategy for identifying fibrous talc and fibrous amphibole and talc intergrowths using polarized light microscopy (PLM) and transmission electron microscopy (TEM). The NIST has begun to draft a document summarizing the properties of fibrous talc observed using PLM and TEM (ASTM International, 2002).

Production

Talc.—In 2002, seven companies operating nine mines in five States produced soapstone, steatite, and talc. All were open pit mines. The producers, in decreasing order of production, were Luzenac America Inc., Wold Minerals Corp., Barrett's Minerals Inc., Gouverneur Talc Co., Milwhite Inc., Suzorite Mineral Products Inc. (Zemex Corp.), and Steatite of Southern Oregon. Two other companies, CalTalc Co. in California and New World Stone Co. in Virginia, worked from stocks. Barrett's Minerals, Gouverneur Talc, Luzenac America, and Wold Minerals were the largest domestic producers, collectively accounting for more than 80% of the tonnage.

In 2002, U.S. mine production was 775,000 t valued at \$19.6 million compared with 863,000 t valued at \$19.5 million in 2001 (tables 1, 2). Production increased in New York, remained unchanged in Oregon, and decreased in Montana, Texas, and Vermont. Montana led all States in the tonnage and value of talc produced, followed by Texas, Vermont, New York, and Oregon. Mines operating in Montana, New York, Texas, and Vermont accounted for nearly all domestic talc production.

Domestic production data were obtained through a voluntary survey of U.S. mining companies conducted by the U.S. Geological Survey (USGS). Survey forms were sent to 11 companies. Responses were received from eight companies. Responses accounted for approximately 97% of the data presented in table 1; the remaining data were estimated from reported prior-year data adjusted according to employment and consuming industry trends.

Barrett's Minerals [a subsidiary of Minerals Technologies Inc. (MTI)] purchased Polar Minerals Inc., which processes barite, calcium carbonate, mica, and talc from worldwide sources. MTI indicated that the purchase would strengthen the company's position in the Midwest. Polar Minerals' product line will supplement the talc products sold by Barrett's Minerals and the calcium carbonate and refractory products sold by MTI. Polar Minerals' products, which are processed in its Wellsville, OH, and Mount Vernon, IN, plants, were sold largely for filler and extender applications (Industrial Minerals, 2002b).

Pyrophyllite.—Piedmont Minerals Co. Inc. and Standard Mineral Co. Inc. operated three mines in North Carolina. Production of pyrophyllite decreased from that of 2001.

Domestic production data were acquired through a voluntary USGS survey of the three U.S. companies that mine pyrophyllite. One company responded to the survey; the remaining data were estimated from reported prior-year data adjusted according to employment and consuming industry trends.

Consumption

Domestic consumption data for talc and pyrophyllite were developed by the USGS from a voluntary survey of U.S. mills. Survey forms were sent to 11 companies operating 14 mills in 6 States for talc and 3 companies operating 3 mills in 2 States for pyrophyllite. Respondents accounted for 64% of the talc data presented in table 3. The remaining data were estimated from reported prior-year data adjusted according to employment and consuming industry trends. One pyrophyllite producer responded.

Talc.—Producers reported that 791,000 t of talc valued at \$76.0 million was sold, used, or exported in 2002, an increase in tonnage from 784,000 t valued at \$84.8 million in 2001. Domestic sales by U.S. producers declined to 629,000 t in 2002 from 671,000 t in 2001. Talc was sold for paint, ceramics (sanitaryware, tiles, etc.), paper, roofing, plastics, rubber, miscellaneous applications, and cosmetics in decreasing order of consumption (table 3). Sales for paper applications accounted for most of the decline in 2002; other applications were relatively unchanged.

Despite lower sales reported by domestic producers of talc for plastics applications, shipments of plastics have continued to increase in recent years. Imports of talc are thought to fill much of the expanding plastics market demand for talc fillers and extenders. While imported talc is not covered by the USGS producer canvass, total sales of talc for plastics applications (domestic plus imported talc) are believed to have approached or possibly exceeded 100,000 metric tons per year of talc for the past 5 years.

Sales of talc to manufacturers of paint, sanitaryware, roofing, and tile generally are tied to the housing industry. Initiation of new privately owned housing units increased to 1.73 million in 2002 from 1.64 million in 2001 (U.S. Census Bureau, 2002¹). Shipments of architectural paint (the major paint market for talc) increased to 1.24 million gallons [4.69 million liters (ML)] in 2002 from 1.19 million gallons (4.5 ML) in 2001 (U.S. Census Bureau, 2002). Data on sales of vitreous china plumbing fixtures (commodes, sinks, urinals, water tanks, etc.) are not available for 2000 and 2001. With the continued increase in housing starts and commercial construction, sales of vitreous china plumbing fixtures probably have increased since 1999.

The ceramic tile industry, another major market for talc, has faced increased competition from imported ceramic tile in recent years. Imports of glazed and unglazed ceramic tiles increased to 24.5 million units valued at \$209 million in 2002 from 21.1 million units valued at \$183 million in 2001.

Most of the 232,000 t of imported talc listed in table 6 was not included in the domestic end-use data listed in table 3. An estimate of the end-use breakdown based on countries of origin, ports of entry, regional end-use patterns, and current domestic markets is plastics, 85,000 t; unknown, 44,000 t, paint, 40,000 t; cosmetics, 22,000 t; ceramics and refractory products, 20,000 t; paper, 14,000 t; and rubber, 7,000 t.

Pyrophyllite.—In 2002, domestic consumption of pyrophyllite declined from that of 2001. Pyrophyllite was used in refractory products, ceramics, paint, insecticides, and rubber in decreasing order of consumption. Sales for paint and refractory products increased. Those for ceramics, insecticides, and rubber decreased. Ceramic and refractory uses accounted for more than 70% of domestic pyrophyllite sales.

Prices

Talc prices varied depending on the quality and the degree and method of processing. The unit value of crude talc was estimated to be \$25 per metric ton. Most of the talc sold in the United States is sold only after crushing and grinding. Consequently, the crude value for talc is of limited use. Following sorting to remove waste, primary crushing, and screening, the unit value of the unmilled talc probably would be in the range of \$50 to \$60 per ton at the mill. The average reported unit value of processed talc was \$96 per ton. The average unit values of crude and processed pyrophyllite were essentially unchanged from those of 2001.

The average free alongside ship unit value for exports of unmilled talc was \$220 per ton. The high average unit value for unmilled talc resulted because there were several small shipments whose value exceeded \$1,000 per ton. This suggests that finished consumer products, such as sculpting-grade talc and body powders, rather than unmilled talc were being shipped. The unit value for milled talc exports was \$219 per ton in 2002 compared with \$204 per ton in 2001. The average customs unit value for imports was \$141 per ton for unground talc compared with \$122 per ton in 2001. The difference was an increase in the value of imports from China, which accounted for 93% of the import tonnage of unground talc. It is likely that some of the talc classified as unground actually has been further processed and commands a higher value than unground talc. The average customs value was \$172 per ton for ground talc

¹A reference that includes a section mark (§) is found in the Internet Reference Cited section.

compared to \$171 per ton in 2001. The average customs value was \$955 per ton for cut or sawed talc compared with \$917 per ton in 2001.

Approximate prices for talc ranged from \$87 per ton to \$361 per ton (Industrial Minerals, 2002c; table 4). Quoted prices should be used only as a guideline because actual prices depend on the terms of the contract between seller and buyer.

Foreign Trade

Talc exports increased in tonnage to 166,000 t and in value to \$35.7 million. Canada, with 80,000 t, was the leading importer of talc from the United States, followed by Mexico, Belgium, Germany, Japan, and Singapore (table 5). Much of the talc exported to Mexico is shipped to United States affiliates operating across the Mexican border and is not reported by the U.S. Census Bureau. Total talc exported across the Mexican border in 2002, including shipments to United States affiliates, exceeded 50,000 t.

Talc imports reported by the U.S. Census Bureau increased in tonnage to 232,000 t and in value to \$52.7 million in 2002. Increased imports from Canada (82,400 t in 2002 versus 53,700 t in 2001) and France (29,200 t in 2002 versus 2,280 t in 2001) accounted for most of this increase. Canada and China supplied 71% of talc imported into the United States (table 6).

About 212,000 t of the talc imported into the United States was crude or milled. Slightly more than 100,000 t entered the United States through the customs district of New Orleans, LA. This talc was shipped from China (81,200 t) and France (19,200 t). The next leading customs districts were Detroit, MI, with imports of 40,500 t (nearly all from Canada) and Miami, FL, with 35,000 t (19,200 t from Spain and 15,700 t from Germany). Following these districts were Ogdensburg, NY (mainly cut or sawn talc from Canada), and Saint Albans, NY (mainly crushed or powdered talc from Canada), each accounting for about 14,000 t of talc imports. About 13,500 t was imported through Buffalo, NY, all being milled talc from Canada. These six port districts accounted for 88% of the tonnage of unmilled and milled talc imports in 2002.

World Review

China remained the world's leading producer of talc, followed by the United States, India, France, Brazil (crude), and Australia. The Republic of Korea was the largest producer of pyrophyllite, followed by Japan and Brazil. China, Japan, the Republic of Korea, and the United States produced 70% of the world's talc and pyrophyllite (table 7).

Brazil.—Magnesita SA announced that it would invest \$10 million during the next 3 years to install flotation equipment and make other upgrades at its talc operation in Brumado (Industrial Minerals, 2002a).

Canada.—Globex Mining Enterprises Inc. announced plans to conduct a feasibility study of a magnesite and talc deposit near Timmins, Ontario. The altered ultrabasic intrusion contains about 100 million metric tons of ore. The primary product will be magnesite for magnesium metal production. Silica and talc will be produced as byproducts. The talc does not contain asbestos and has a brightness of 89, making it suitable for cosmetics and paper applications (North American Minerals News, 2002).

Slovakia.—Mine development at the Poloma deposit in Roznava was temporarily halted when Rima Muran sro, the operator, encountered financial difficulties unrelated to the talc project. To counter these difficulties, EuroGas Inc. plans to acquire 100% share in Rozmin sro, which owns the Gemerska talc deposit. Work on the deposit was expected to resume once this transaction occurred (Industrial Minerals, 2002d).

Outlook

The U.S. economy has not shown much sign of recovery, although construction of residential and commercial buildings, the major market for talc-based products, continued at near record levels. Domestic sales of talc and talc-based products have not taken advantage of the strong construction market because imports of talc and such talc-based products as sanitaryware and tiles have increased during the past several years. With the continuing construction boom, adhesives, ceramics, joint compounds, paint, and roofing markets, all of which consume talc, should at least maintain current levels of production and sales for the next 2 to 3 years. No major changes are anticipated in pyrophyllite markets in the near future.

References Cited

- ASTM International, 2002, Final program of the 2002 Johnson conference—A review of asbestos monitoring methods and results for the New York World Trade Center, Libby vermiculite, and fibrous talc, Johnson, VT, July 21-25, 2002: West Conshohocken, PA, ASTM International, 59 p.
- Greenwood, W.S., and Wylie, A.G., 2002, The optical properties and chemical composition of fibrous talc, *in* Final program of the 2002 Johnson conference—A review of asbestos monitoring methods and results for the New York World Trade Center, Libby vermiculite, and fibrous talc, Johnson, VT, July 21-25, 2002: West Conshohocken, PA, ASTM International, [unpaginated].
- Industrial Minerals, 2002a, Magnesita to produce Al₂O₃-C refractories and upgrades talc plant: Industrial Minerals, no. 423, December, p. 13.
- Industrial Minerals, 2002b, MTI acquires Polar Minerals: Industrial Minerals, no. 421, October, p. 11.
- Industrial Minerals, 2002c, Prices: Industrial Minerals, no. 423, December, p. 71.
- Industrial Minerals, 2002d, Rozmin talc delayed: Industrial Minerals, no. 416, May, p. 15.
- North American Minerals News, 2002, Quebec government buys into magnesite-talc money spinner: North American Minerals News, no. 84, May, p. 2.
- U.S. Census Bureau, 2002, Paint, varnish, and lacquer—Fourth quarter 2002: U.S. Census Bureau MQ325F(02)-4, February, 3 p.
- Van Gosen, B.S., and Meeker, G.P., 2002, Geologic origins of the transitional fibers in fibrous talc deposits, *in* Final program of the 2002 Johnson conference—A review of asbestos monitoring methods and results for the New York World Trade Center, Libby vermiculite, and fibrous talc, Johnson, VT, July 21-25, 2002: West Conshohocken, PA, ASTM International, [unpaginated].

Internet Reference Cited

U.S. Census Bureau, 2002, Quarterly starts and completions by purpose and design, accessed May 12, 2003, at URL <http://www.census.gov/const/www/newresconstindex.html>.

GENERAL SOURCES OF INFORMATION

U.S. Geological Survey Publications

Greene, R.C., 1995, Talc Resources of the Conterminous United States. Open-File Report OF 95-586.
Talc. Ch. in United States Mineral Resources. Professional Paper 820, 1973.
Talc and Pyrophyllite. Ch. in Mineral Commodity Summaries, annual.
U.S. Talc—Baby Powder and Much More. Fact Sheet FS-065-00, 2000.

Other

Ceramic Industry.
Engineering and Mining Journal.
Mining Engineering.
Paint and Coatings Industry.
Talc and Pyrophyllite. Ch. in Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 675, 1985.
The Talc Industry—An Overview. U.S. Bureau of Mines Information Circular 9220, 1989.

TABLE 1
SALIENT TALC AND PYROPHYLLITE STATISTICS¹

(Thousand metric tons unless otherwise specified)

		1998	1999	2000	2001	2002
United States:						
Mine production, crude:						
Talc		971	925	851	863 ^r	775
Pyrophyllite		W	W	W	W	W
Value:						
Talc	thousands	\$27,300	\$26,100	\$22,300	\$19,500 ^r	\$19,600
Pyrophyllite	do.	W	W	W	W	W
Sold by producers, crude and processed:						
Talc		870	881	821	784 ^r	791
Pyrophyllite		W	W	W	W	W
Value:						
Talc	thousands	\$109,000	\$102,000	\$96,100	\$84,800 ^r	\$76,000
Pyrophyllite	do.	W	W	W	W	W
Exports, talc ²		146	147	154	137	166
Value	thousands	\$26,000	\$27,200	\$32,800	\$28,800	\$35,700
Imports for consumption		165	208	270	180	232
Value	thousands	\$23,300	\$35,300	\$42,500	\$35,800	\$52,700
Apparent consumption ³		990	986	967	906 ^r	841
World, production		9,410 ^r	9,470 ^r	8,650 ^r	8,800 ^r	8,870 ^e

^eEstimated. ^rRevised. W Withheld to avoid disclosing company proprietary data.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Excludes powders--talcum (in package), face, and compact.

³Production plus imports minus exports plus adjustments in Government and industry stock. Does not include pyrophyllite.

TABLE 2
CRUDE TALC PRODUCED IN THE UNITED STATES,
BY STATE^{1, 2}

(Thousand metric tons and thousand dollars)

State	2001		2002	
	Quantity	Value	Quantity	Value
Texas	234	4,070	W	W
Other ³	629 ^r	15,400 ^r	775	19,600
Total	863 ^r	19,500 ^r	775	19,600

^rRevised. W Withheld to avoid disclosing company proprietary data.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Excludes pyrophyllite.

³Includes California (2001), Montana, New York, Oregon, Vermont, and Texas (2002).

TABLE 3
END USES FOR GROUND TALC^{1,2}

(Thousand metric tons)

	2001 ^r	2002
Ceramics	175	174
Cosmetics	22	16
Insecticides	--	--
Paint	200	199
Paper	142	112
Plastics	36	38
Refractories	--	--
Roofing	41	40
Rubber	33	26
Other ³	21	24
Total	671	629

^rRevised. -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Excludes pyrophyllite.

³Includes art sculpture, asphalt filler, auto body filler, construction caulks, flooring, joint compounds, and other uses not specified.

TABLE 4
PRICES OF TALC

(Dollars per metric ton)

	Price
New York:	
Paint:	
200 mesh	120
400 mesh	200
Ceramic:	
200 mesh	87
325 mesh	110
Indian, cosmetic-grade	190-195
Chinese, normal, ex-store:	
UK 200 mesh	314-353
UK 350 mesh	330-361

Source: Industrial Minerals, December 2002.

TABLE 5
U.S. EXPORTS OF TALC^{1,2}

(Thousand metric tons and thousand dollars)

Country	2001		2002	
	Quantity	Value ³	Quantity	Value ³
Belgium	4	1,610	10	1,880
Canada ⁴	64	10,900	80	15,400
Germany	5	943	7	1,200
Japan	10	1,770	7	1,410
Mexico	6	623	14	1,570
Singapore	5	1,390	6	1,970
Other ⁵	44	11,600 ^r	39	12,200
Total	137	28,800	166	35,700

^rRevised.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Excludes powders--talcum (in package), face, and compact.

³Free alongside ship.

⁴Probably includes shipments in transit through Canadian ports.

⁵Includes 54 countries in 2001 and 61 countries in 2002.

Source: U.S. Census Bureau.

TABLE 6
U.S. IMPORTS FOR CONSUMPTION OF TALC, BY COUNTRY¹

Country	Not crushed or powdered		Crushed or powdered		Cut and sawed		Total unmanufactured	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
2001:								
Brazil	--	--	132	\$33	68	\$90	200	\$123
Canada	160	\$82	45,100	12,500	8,460	6,510	53,700	19,100
China	79,300	9,590	18,700	197	1,270	1,220	99,300	11,000
France	--	--	819	768	1,470	1,980	2,280	2,750
Japan	--	--	1,200	535	384	421	1,580	956
Other ²	4,220	529	18,300	368	476	921	23,000	1,820
Total	83,600	10,200	84,300	14,400	12,100	11,100	180,000	35,800
2002:								
Brazil	18	20	78	34	104	132	200	186
Canada	20	7	69,000	18,500	13,300	10,700	82,400	29,100
China	79,300	11,200	673	238	2,300	2,280	82,200	13,700
France	5,910	691	20,000	1,290	3,280	4,170	29,200	6,150
Japan	--	--	401	912	238	279	639	1,190
Other ²	26	71	36,400	773	483	1,350	36,900	2,200
Total	85,200	12,000	127,000	21,800	19,800	18,900	232,000	52,700

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes 21 countries in 2001 and 19 countries in 2002.

Source: U.S. Census Bureau.

TABLE 7
TALC AND PYROPHYLLITE: WORLD PRODUCTION, BY COUNTRY AND PRODUCT^{1,2}

(Metric tons)

Country ³	1998	1999	2000	2001	2002 ^e
Argentina:					
Pyrophyllite	3,480	3,400	3,400 ^e	3,400 ^e	3,400
Steatite ^e	300	300	300	300	300
Talc	14,585	10,542	10,000 ^e	10,000 ^e	10,000
Australia: ⁴					
Pyrophyllite	702	347	1,727	1,500 ^e	1,500
Talc	199,315	190,037	178,545	180,000 ^e	180,000
Austria, soapstone and crude talc	137,114	129,516	130,000	140,000 ^e	135,000
Brazil:					
Pyrophyllite, crude	161,000	160,000	150,000	150,000 ^e	150,000
Talc:					
Crude	289,000	300,000	300,000	300,000 ^e	300,000
Marketable product ^{e, 5}	2,000	2,000	2,000	2,000	2,000
Bhutan, talc ^e	3,200	3,400	3,700	3,800	3,800
Canada, pyrophyllite, soapstone, talc	71,000	79,000	86,000	86,000 ^e	86,000
Chile, talc	3,772	2,231	2,421	4,177 ^r	4,200
China, unspecified ^e	3,800,000	3,900,000	3,500,000	3,500,000	3,600,000
Colombia, pyrophyllite, soapstone, talc ^e	15,000	15,000	15,000	15,000	15,000
Egypt, pyrophyllite, soapstone, steatite, talc ^e	39,720 ⁶	40,000	40,000	40,000	40,000
Finland, talc ^e	350,000	469,000 ⁶	-- ^r	-- ^r	--
France, talc, crude ^e	360,000	370,000	350,000	350,000	350,000
Germany, steatite and marketable talc ^e	9,000 ⁶	9,000	8,000	10,000	10,000
Guatemala, talc ^e	948	--	--	--	--
Hungary, talc ^e	500	500	500	500	500
India: ^e					
Pyrophyllite	79,951 ⁶	85,000	85,000	86,000	85,000
Steatite	447,550 ⁶	450,000	460,000	460,000	465,000
Iran, talc ^{e, 7}	27,038 ^{r, 6}	25,000 ^r	25,000 ^r	25,000 ^r	25,000
Italy, steatite and talc ^e	138,000	140,000	140,000	140,000	140,000
Japan:					
Pyrophyllite	764,079	694,317	692,998	626,000 ^e	620,000
Talc	50,000	50,000	50,000	45,000 ^e	45,000
Korea, North, unspecified ^e	150,000	120,000	120,000	120,000	120,000
Korea, Republic of:					
Pyrophyllite	843,609	754,657	917,973	1,101,825 ^r	1,100,000
Talc	24,411	15,313	11,344	47,712 ^r	45,000
Macedonia, talc ^e	10,000	9,000	10,000	10,000	10,000
Mexico, talc	18,843	18,981	20,569	77,650 ^r	70,000
Morocco, unspecified	12,000 ^e	14,655 ^r	12,522 ^r	15,000 ^e	15,000
Nepal, talc ⁸	5,553	6,157	5,852 ^r	6,000 ^e	5,900
Norway, soapstone, steatite, talc ^e	26,000	26,000	27,000	27,000	28,000
Pakistan, pyrophyllite	48,927	67,670	54,365	55,000 ^e	55,000
Paraguay, pyrophyllite, soapstone, talc ^e	200	200	200	200	200
Peru:					
Pyrophyllite ^e	8,000	8,000	8,000	8,000	8,000
Talc	11,165	12,085	9,668	11,165 ^r	11,200
Portugal, talc ^e	8,400 ⁶	8,200	8,200	8,200	8,200
Romania, talc	8,134	8,289	7,850	7,850 ^e	7,900
Russia, talc ^e	79,000	90,000	100,000	100,000	100,000
Slovakia, talc	2,820	1,900	1,800	2,000 ^e	2,000
South Africa:					
Pyrophyllite	11,500	13,277	11,989	14,386	17,523 ⁶
Talc	11,328	7,873	5,600	3,218	2,511 ⁶
Spain, steatite and talc ^e	110,000	110,000	100,000	100,000	100,000
Sweden, soapstone and talc ^e	25,000	25,000	20,000 ^r	15,000 ^{r, 6}	15,000 ⁶

See footnotes at end of table.

TABLE 7--Continued
TALC AND PYROPHYLLITE: WORLD PRODUCTION, BY COUNTRY AND PRODUCT^{1,2}

(Metric tons)

Country ³	1998	1999	2000	2001	2002 ^e
Taiwan, talc	73	201	--	130 ^r	27 ⁶
Thailand:					
Pyrophyllite	40,241	38,053	46,011	41,000 ^e	40,000
Talc	2,172	4,960	7,390	6,000 ^e	6,500
Turkey, talc and pyrophyllite	5,000 ^e	48,378	54,278	50,000 ^e	50,000
United Kingdom, pyrophyllite, soapstone, talc ^e	4,937 ⁶	5,000	5,000	5,000	5,000
United States:					
Pyrophyllite	W	W	W	W	W
Talc	971,000	925,000	851,000	863,000 ^r	775,000 ⁶
Uruguay, pyrophyllite, soapstone, talc	972	2,905	2,903 ^r	2,100 ^r	2,200
Zambia, talc ^e	-- ^r	-- ^r	-- ^r	-- ^r	--
Zimbabwe, talc	1,039	1,000 ^e	989 ^r	1,273 ^r	1,000
Grand total	9,410,000 ^r	9,470,000 ^r	8,650,000 ^r	8,880,000 ^r	8,870,000
Of which:					
Pyrophyllite	1,960,000	1,820,000	1,970,000	2,090,000 ^r	2,080,000
Steatite	448,000	450,000	460,000	460,000	465,000
Talc	2,450,000	2,530,000	1,960,000 ^r	2,060,000 ^r	1,970,000
Unspecified	4,540,000	4,660,000	4,260,000 ^r	4,270,000 ^r	4,360,000

^eEstimated. ^rRevised. W Withheld to avoid disclosing company proprietary data; not included in "Total." -- Zero.

¹World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Table includes data available through April 24, 2003.

³In addition to the countries listed, Nigeria may produce talc, but information is inadequate to estimate output.

⁴Data based on Australian fiscal year ending June 30 of year stated.

⁵Direct sales and/or beneficiated (marketable) product.

⁶Reported figure.

⁷Data based on Iranian fiscal year beginning March 21 of year stated.

⁸Data based on Nepalese fiscal year beginning mid-July of year stated.